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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
STOFFREGEN, JOEL	

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2626	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/696,460	Applicant(s) YANG ET AL.	
	Examiner Joel Stoffregen	Art Unit 2626	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/28/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the original application filed on 10/28/2003.

2. Claims 1-31 are currently pending in this application. Claims 1, 10, 16, 23, and 29 are independent claims.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 1, 10, and 29-31** are rejected under 35 U.S.C. 102(b) as being anticipated by **Johnson (Patent No.: US 6,415,253)**.

5. Regarding **claim 1**, Johnson teaches an article comprising a machine-readable medium ("memory", column 6, lines 1-3) embodying information indicative of instructions that when performed by one or more machines result in operations ("system can be implemented by commercially available DSP's, RISC processors, or microprocessors", column 6, lines 3-5) comprising:

determining a speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on input representing audio information ("speech signal", column 6, lines 23-24); and

performing smoothing during noise suppression of the input information based on the determined speech-presence-uncertainty metric ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57) to produce output representing audio information with enhanced speech and reduced musical noise ("keeping the filtered speech clear and natural, and suppressing the musical noise artifacts", column 11, lines 16-18).

6. Regarding **claim 10**, Johnson teaches a method comprising:

determining a speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on input representing audio information ("speech signal", column 6, lines 23-24); and

performing smoothing during noise suppression of the input information based on the determined speech-presence-uncertainty metric ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57) to produce output representing audio information with enhanced speech and reduced musical noise ("keeping the filtered speech clear and natural, and suppressing the musical noise artifacts", column 11, lines 16-18).

7. Regarding **claim 29**, Johnson teaches a system comprising:

means for suppressing noise in input representing audio information ("apparatus for enhancing noise-corrupted speech", column 5, lines 48-49) based on filter coefficients ("filtered filter coefficients are then used to filter the frequency domain data", column 13, lines 24-25); and

speech-presence-uncertainty-assessment means ("voice activity detector [VAD] 20", column 7, line 29) for driving smoothing of the filter coefficients used by the means for suppressing noise ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57, where the Wiener filter coefficients are based on the PSD [see column 12, lines 42-45]) to reduce musical noise and enhance speech ("keeping the filtered speech clear and natural, and suppressing the musical noise artifacts", column 11, lines 16-18).

8. Regarding **claim 30**, Johnson further teaches a means for smoothing the filter coefficients ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57, where the Wiener filter coefficients are based on the PSD [see column 12, lines 42-45]).

9. Regarding **claim 31**, Johnson further teaches that the means for suppressing noise comprises a minimum mean square error estimator (see column 12, lines 42-43, the filtering is done by a Wiener filter, which is well-known in the art to be a minimum mean square error estimator).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. **Claims 2-9 and 11-28** rejected under 35 U.S.C. 103(a) as being unpatentable over **Johnson (Patent No.: US 6,415,253)**.

12. Regarding **claim 2**, Johnson further teaches that determining the speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) comprises:

determining a speech presence likelihood ("speech states based on a likelihood that speech exists", column 10, lines 57-58) based on the input information ("by measuring the energy and frequency content of the current data frame of samples", column 7, lines 34-35); and

setting the speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on the determined speech presence likelihood ("VAD 20 outputs ... the speech state of the current frame", column 10, lines 23-25).

Johnson does not explicitly state that the speech presence likelihood is also based on filter coefficients from a noise suppressor system. However, Johnson does teach that the VAD 20 computes estimated noise energy (see column 8, lines 47-51, and equation [4]), and that the Wiener filter coefficients are based on estimated noise energy (see column 12, lines 60-62 and equation [16]). Equation [4] is equivalent to equation [16]. Johnson is essentially computing the same value in two different blocks. Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the VAD 20 use the estimated noise energy of the Wiener filter coefficients in order to decrease processing time.

13. Regarding **claim 3**, Johnson further teaches that performing smoothing during noise suppression comprises:

low-pass filtering the filter coefficients from the noise suppressor system based on the speech-presence-uncertainty metric ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57, where the Wiener filter coefficients are based on the

PSD [see column 12, lines 42-45] and convolving a power spectrum with a window is equivalent to low-pass filtering); and

suppressing noise in the input information based on the filtered filter coefficients ("filtered filter coefficients are then used to filter the frequency domain data", column 13, lines 24-25).

14. Regarding **claim 4**, Johnson further teaches that setting the speech-presence-uncertainty metric comprises:

determining a smoothed speech presence likelihood ("speech states based on a likelihood that speech exists", column 10, lines 57-58) based on the determined speech presence likelihood and a past smoothed speech presence likelihood ("VAD 20 determines that speech exists in the input signal when PDF='1' for three consecutive frames", see FIG. 2, column 8, lines 1-39, the speech presence is determined using past and current data); and

setting the speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on the determined speech presence likelihood ("VAD 20 outputs ... the speech state of the current frame", column 10, lines 23-25).

15. Regarding **claim 5**, Johnson further teaches that the speech-presence-uncertainty metric comprises a Boolean value ("two speech states", column 10, line 57), low-pass filtering comprises selectively low-pass filtering the filter coefficients based on

the Boolean value ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57), and suppressing the noise comprises suppressing the noise based on the selectively filtered filter coefficients ("filtered filter coefficients are then used to filter the frequency domain data", column 13, lines 24-25).

16. Regarding **claim 6**, Johnson further teaches that determining the speech presence likelihood comprises determining the speech presence likelihood based on transformed information ("VAD 20 receives... magnitude components of the speech signal from the FFT module 18", column 7, lines 29-32), suppressing the noise comprises suppressing the noise based on the transformed information ("filtered filter coefficients are then used to filter the frequency domain data", column 13, lines 24-25), and the operations further comprises:

performing a time to frequency transform on the input information ("FFT module 18 receives the 640-point frames outputted from the Hanning window 16, produces 321 sets of a magnitude component and a phase component of frequency spectrum", column 7, lines 20-23); and

generating the output information by performing an inverse time to frequency transform on the noise suppressed information ("inverse FFT module 26 receives the magnitude modified FFT frame, and converts the FFT frame in the frequency domain to a noise-suppressed extended frame in the time domain", column 15, lines 28-31).

17. Regarding **claim 7**, Johnson further teaches that the speech-presence-uncertainty metric comprises a continuous value and low-pass filtering the filter coefficients comprises variably low-pass filtering based on the speech-presence-uncertainty metric to effect a varying amount of smoothing ("VAD 20 may output a control signal representing more minutely categorized speech states, based on the likelihood of speech existence, so that the size of the window is changed substantially continuously in accordance with the likelihood", column 11, lines 6-10).

18. Regarding **claim 8**, Johnson further teaches that the filter coefficients comprise filter coefficients formulated as a component-wise multiplication of a noisy speech spectrum in a frequency domain (see equation [18], the PSD of the speech is multiplied by the inverse of the PSD of the speech plus noise).

19. Regarding **claim 9**, Johnson further teaches that determining the speech-presence-uncertainty metric comprises determining the speech-presence-uncertainty metric based on a full band minimum mean square error estimator weighting of the audio input (see rejection of claim 2 above, the speech-presence-uncertainty metric is determined in part by Wiener filter coefficients. Wiener filtering is well-known in the art to be a minimum mean square error estimator).

20. Regarding **claim 11**, Johnson further teaches that determining the speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) comprises:

determining a speech presence likelihood ("speech states based on a likelihood that speech exists", column 10, lines 57-58) based on the input information ("by measuring the energy and frequency content of the current data frame of samples", column 7, lines 34-35);

determining a smoothed speech presence likelihood ("speech states based on a likelihood that speech exists", column 10, lines 57-58) based on the determined speech presence likelihood and a past smoothed speech presence likelihood ("VAD 20 determines that speech exists in the input signal when PDF='1' for three consecutive frames", see FIG. 2, column 8, lines 1-39, the speech presence is determined using past and current data); and

setting the speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on the determined smoothed speech presence likelihood ("VAD 20 outputs ... the speech state of the current frame", column 10, lines 23-25).

Johnson does not explicitly state that the speech presence likelihood is also based on filter coefficients from a noise suppressor system. However, Johnson does teach that the VAD 20 computes estimated noise energy (see column 8, lines 47-51, and equation [4]), and that the Wiener filter coefficients are based on estimated noise energy (see column 12, lines 60-62 and equation [16]). Equation [4] is equivalent to

equation [16]. Johnson is essentially computing the same value in two different blocks. Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the VAD 20 use the estimated noise energy of the Wiener filter coefficients in order to decrease processing time.

21. Regarding **claim 12**, Johnson further teaches that performing smoothing during noise suppression comprises:

low-pass filtering the filter coefficients from the noise suppressor system based on the speech-presence-uncertainty metric ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57, where the Wiener filter coefficients are based on the PSD [see column 12, lines 42-45] and convolving a power spectrum with a window is equivalent to low-pass filtering); and

suppressing noise in the input information based on the filtered filter coefficients ("filtered filter coefficients are then used to filter the frequency domain data", column 13, lines 24-25).

22. Regarding **claim 13**, Johnson further teaches that determining the speech presence likelihood comprises determining the speech presence likelihood based on transformed information ("VAD 20 receives... magnitude components of the speech signal from the FFT module 18", column 7, lines 29-32), suppressing the noise

comprises suppressing the noise based on the transformed information ("filtered filter coefficients are then used to filter the frequency domain data", column 13, lines 24-25), and the operations further comprises:

performing a time to frequency transform on the input information ("FFT module 18 receives the 640-point frames outputted from the Hanning window 16, produces 321 sets of a magnitude component and a phase component of frequency spectrum", column 7, lines 20-23); and

generating the output information by performing an inverse time to frequency transform on the noise suppressed information ("inverse FFT module 26 receives the magnitude modified FFT frame, and converts the FFT frame in the frequency domain to a noise-suppressed extended frame in the time domain", column 15, lines 28-31).

23. Regarding **claim 14**, Johnson further teaches that the filter coefficients comprise filter coefficients formulated as a component-wise multiplication of a noisy speech spectrum in a frequency domain (see equation [18], the PSD of the speech is multiplied by the inverse of the PSD of the speech plus noise).

24. Regarding **claim 15**, Johnson further teaches that determining the speech-presence-uncertainty metric comprises determining the speech-presence-uncertainty metric based on a full band minimum mean square error estimator weighting of the audio input (see rejection of claim 11 above, the speech-presence-uncertainty metric is

determined in part by Wiener filter coefficients. Wiener filtering is well-known in the art to be a minimum mean square error estimator).

25. Regarding **claim 16**, Johnson teaches a system comprising:

a noise suppressor system ("apparatus for enhancing noise-corrupted speech", column 5, lines 48-49) that receives input representing audio information ("speech signal", column 6, lines 23-24) and generates filter coefficients ("SWF module 22 computes an optimal set of Wiener filter coefficients", column 12, lines 42-43) ; and

a back-end smoothing system ("voice activity detector [VAD] 20", column 7, line 29) that receives the input information ("receives the 80-sample filtered frames from the high-pass and all-pass filter 14, and the 321 magnitude components of the speech signal from the FFT module 18", column 7, lines 29-32), determines a speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on the input information ("by measuring the energy and frequency content of the current data frame of samples", column 7, lines 34-35), and performs smoothing during noise suppression of the input information based on the determined speech-presence-uncertainty metric ("if the current frame is classified as noise, then the PSD estimate is smoothed by convolving it with a larger window... if the current frame is classified as speech, then the PSD estimate is smoothed with a smaller window", column 12, lines 53-57) to produce output representing audio information with enhanced speech and reduced musical noise ("keeping the filtered speech clear and natural, and suppressing the musical noise artifacts", column 11, lines 16-18).

Johnson does not explicitly state that the speech-presence-uncertainty metric is also based on filter coefficients. However, Johnson does teach that the VAD 20 computes estimated noise energy (see column 8, lines 47-51, and equation [4]), and that the Wiener filter coefficients are based on estimated noise energy (see column 12, lines 60-62 and equation [16]). Equation [4] is equivalent to equation [16]. Johnson is essentially computing the same value in two different blocks. Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the VAD 20 use the estimated noise energy of the Wiener filter coefficients in order to decrease processing time.

26. Regarding **claim 17**, Johnson further teaches that the noise suppressor system comprises a minimum mean square error estimator ("Wiener filter", column 12, lines 42-43, where Wiener filtering is well-known in the art to be a minimum mean square error estimator), and the filter coefficients comprise filter coefficients formulated as a component-wise multiplication of a noisy speech spectrum in a frequency domain (see equation [18], the PSD of the speech is multiplied by the inverse of the PSD of the speech plus noise).

27. Regarding **claim 18**, Johnson further teaches that the speech-presence-uncertainty metric is based on a full band minimum mean square error estimator weighting (see rejection of claim 16 above, the speech-presence-uncertainty metric is

determined in part by Wiener filter coefficients. Wiener filtering is well-known in the art to be a minimum mean square error estimator).

28. Regarding **claim 19**, Johnson further teaches:

a communication interface (see column 5, line 67, the system receives information from a telephone line, so a communication interface would be inherent);

an input-output system (see column 6, lines 13-14, the system inputs speech and outputs noise-reduced speech, so an input-output system would be inherent); and

a processing system coupled with the communication interface and the input-output system (see column 6, lines 3-5, a processor implements the system, so it would be inherent that all components are connected to the processor).

29. Regarding **claim 20**, Johnson further teaches that the noise suppressor system and the back-end smoothing system are integrated with the processing system (see column 6, lines 3-5, a processor implements the system, so it would be inherent that all components are connected to the processor).

30. Regarding **claim 21**, Johnson further teaches that the noise suppressor system ("apparatus for enhancing noise-corrupted speech", column 5, lines 48-49) and the back-end smoothing system ("voice activity detector [VAD] 20", column 7, line 29) are integrated with the input-output system (the systems receive inputs and outputs, so it would be inherent that they are connected to an input-output system).

31. Regarding **claim 22**, Johnson further teaches that the input information is received from the input-output system (see column 6, lines 13-14, the system inputs speech, so it would be inherent to input the speech to an input-output system).

32. Regarding **claim 23**, Johnson teaches an apparatus comprising:

speech presence uncertainty assessment circuitry ("voice activity detector [VAD] 20", column 7, line 29) coupled to receive input representing audio information ("receives the 80-sample filtered frames from the high-pass and all-pass filter 14, and the 321 magnitude components of the speech signal from the FFT module 18", column 7, lines 29-32), wherein the speech presence uncertainty assessment circuitry determines a speech-presence-uncertainty metric ("control signal outputted from the VAD 20", column 10, lines 56-57) based on the input audio information ("by measuring the energy and frequency content of the current data frame of samples", column 7, lines 34-35); and

smoothing circuitry ("SWF module 22", column 12, line 42) comprising a filter (see column 12, lines 53-57, the PSD is convolved with a window, which is a form of filtering) and a multiplier unit (see column 12, lines 53-57, convolution is a form of multiplication), the filter coupled to receive the noise reduction filter coefficients (see column 12, lines 42-45, Wiener filter coefficients are based on the PSD), and the multiplier unit coupled to receive the input audio information (see column 12, lines 42-45, the PSD is based on the input speech) and output smoothed filter coefficients from

the filter (see column 12, lines 53-57, the convolution smoothes the PSD, which results in smoothed Wiener filter coefficients).

Johnson does not explicitly state that the speech-presence-uncertainty metric is also based on noise reduction filter coefficients. However, Johnson does teach that the VAD 20 computes estimated noise energy (see column 8, lines 47-51, and equation [4]), and that the Wiener filter coefficients are based on estimated noise energy (see column 12, lines 60-62 and equation [16]). Equation [4] is equivalent to equation [16]. Johnson is essentially computing the same value in two different blocks. Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the VAD 20 use the estimated noise energy of the Wiener filter coefficients in order to decrease processing time.

33. Regarding **claim 24**, Johnson further teaches that the speech-presence-uncertainty metric is based on a full band minimum mean square error estimator weighting (see rejection of claim 23 above, the speech-presence-uncertainty metric is determined in part by Wiener filter coefficients. Wiener filtering is well-known in the art to be a minimum mean square error estimator).

34. Regarding **claim 25**, Johnson further teaches that the noise reduction filter coefficients comprise filter coefficients formulated as a component-wise multiplication of a noisy speech spectrum in a frequency domain (see equation [18], the Wiener filter

coefficients are computed by multiplying the PSD of the speech by the inverse of the PSD of the speech plus noise).

35. Regarding **claim 26**, Johnson further teaches a time to frequency unit coupled to receive speech data and transform the speech data into the input information ("FFT module 18 receives the 640-point frames outputted from the Hanning window 16, produces 321 sets of a magnitude component and a phase component of frequency spectrum", column 7, lines 20-23), and a frequency to time unit coupled with the multiplier unit to transform the multiplier unit's output to generate enhanced speech data output with reduced musical noise ("inverse FFT module 26 receives the magnitude modified FFT frame, and converts the FFT frame in the frequency domain to a noise-suppressed extended frame in the time domain", column 15, lines 28-31).

36. Regarding **claim 27**, Johnson further teaches that the filter comprises a low-pass filter (see column 12, lines 53-57, convolving a power spectrum with a window is equivalent to low-pass filtering).

37. Regarding **claim 28**, Johnson further teaches that the low-pass filter comprises an FFT/IFFT filter (see FIG 1, the input to the SWF module 22 is FFT module 18, and the output of the noise suppression module is IFFT module 26, everything between 18 and 26, including the low-pass filter, would be part of an FFT/IFFT system).

Conclusion

38. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Adlersberg et al. (Patent No.: US 5,012,519), Mattila et al. (Patent No.: US 6,810,273), Hayata et al. (Patent No.: US 5,819,218), Sirivara (Patent No.: US 6,519,559), Anderson et al. (Patent No.: US 6,453,285), Anderson et al. (Patent No.: US6,351,731), Arslan et al. (Patent No.: US 5,706,395), McAulay et al. ("Speech Enhancement Using a Soft-Decision Noise Suppression Filter"), and Martin ("Noise Power Spectral Density Estimation Based on Optimal Smoothing and Minimum Statistics") teach methods of noise suppression.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joel Stoffregen whose telephone number is (571) 270-1454. The examiner can normally be reached on Monday - Friday, 9:00 a.m. - 6:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JS

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SUPERVISORY PATENT EXAMINER